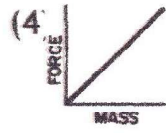
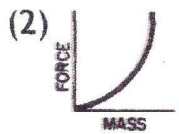
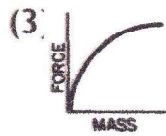
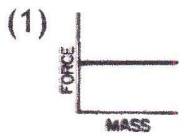


31. Which graph best represents the relationship between the masses of different objects and the gravitational force acting on them as they fall freely near the Earth's surface?



32. If a 30-newton force is required to accelerate a 2-kilogram object at 10 meters per second<sup>2</sup>, over a level floor, then the magnitude of the frictional force acting on the object is

- (1) 0 N                      (3) 20 N  
(2) 10 N                    (4) 30 N

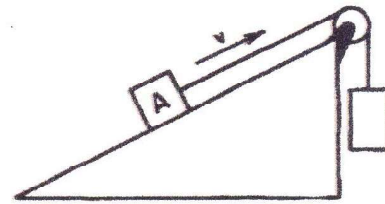
33. The table below lists the coefficients of kinetic friction for four materials sliding over steel.

Material	$\mu_k$
aluminum	0.47
brass	0.44
copper	0.36
steel	0.57

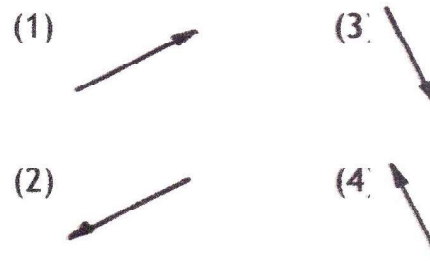
A 10.-kilogram block of each of the materials in the table is pulled horizontally across a steel floor at constant velocity. Which block would require the smallest applied force to keep it moving at constant velocity?

- (1) aluminum              (3) copper  
(2) brass                    (4) steel

34. Block A is pulled with constant velocity up an incline as shown in the diagram below.



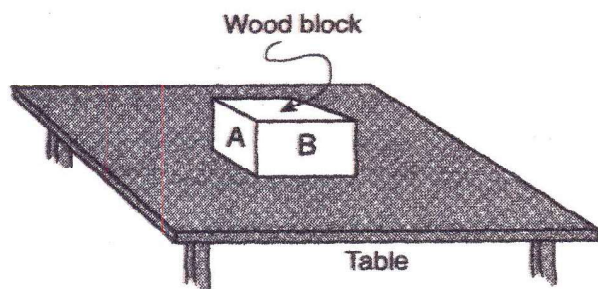
Which arrow best represents the direction of the force of friction acting on block A?



35. Sand is often placed on an icy road because the sand

- (1) decreases the coefficient of friction between the tires of a car and the road  
(2) increases the coefficient of friction between the tires of a car and the road  
(3) decreases the gravitational force on a car  
(4) increases the normal force of a car on the road

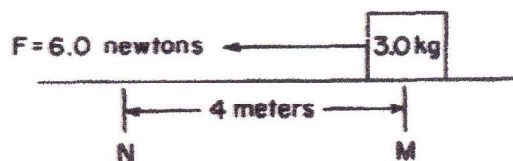
36. In the diagram below, surface *B* of the wooden block has the same texture as surface *A*, but twice the area of surface *A*



If force  $F$  is required to slide the block at constant speed across the table on surface *A*, approximately what force is required to slide the block at constant speed across the table on surface *B*?

- (1)  $F$  (3)  $\frac{1}{2}F$   
(2)  $2F$  (4)  $4F$

Base your answers for questions 37 and 38 on the diagram below which represents a 3.0-kilogram mass being moved at a constant speed by a force of 6.0 Newtons.



37. If the surface were frictionless, the 6.0-newton force would produce an acceleration of
- (1)  $0.33 \text{ m/s}^2$  (3)  $6 \text{ m/s}^2$   
(2)  $2 \text{ m/s}^2$  (4)  $18 \text{ m/s}^2$
38. The magnitude of the force of friction acting on the mass is
- (1) 0 N (3) 3 N  
(2) 1.8 N (4) 6 N